DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

MULTIMODE DIGITAL RADIO (MDR) MAINTENANCE DATA
TERMINAL (MDT) MAINTENANCE APPLICATION
SOFTWARE REQUIREMENTS SPECIFICATION

DRAFT
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1.0   SCOPE

1.1   Identification

This document contains the specification for Multimode Digital Radio (MDR) Maintenance Data Terminal (MDT) Maintenance Application software (SW) module to be hosted on the FAA's Maintenance Data Terminal (MDT). This SW CSCI, hereafter referred to as the Maintenance Data Terminal Software (MDTS), will enable the MDT to control the NEXt generation air/ground COMmunication (NEXCOM) radio, the Multimode Digital Radio (MDR), and to request readout of the MDR's operational and maintenance parameters. This document describes the SW function required for the MDTS to carry out the required control and maintenance function. This document was prepared in accordance with the format requirements of FAA standard FAA-STD-005e.

The FAA maintenance field representatives use the MDT in the ground facilities where MDR is installed to perform parameter setting, readout, and associated control and maintenance functions. The MDT SW module and an Interface control document (ICD) describing the MDR/MDT interface will be delivered with the MDR hardware.

1.2   Functional Overview

The MDR Subsystem Specification (SSS), FAA-E-2938, specifies the requirements for the parameters that need to be adjustable in the field and that need to be modifiable in the field. This function will be carried out via the MDT, a laptop computer based tool used by the FAA field personnel for fieldwork.

The MDT is the primary tool for FAA field personnel to perform equipment maintenance. The MDT is connected to the MDR via an RS-232 interface, as specified in the MDR SSS, Section 3.3.2.1. The MDT SW then signs on to the MDR in a secure manner and carries out the tasks of interrogating MDR parameter values and other relevant maintenance information as needed and verifying the modifications.

2.0   APPLICABLE DOCUMENTS

2.1   Government Documents

The following documents form a part of this specification and are applicable to the extent specified here. In case of conflict between the documents referenced here and the contents of this specification, the contents of this specification shall take precedence.

2.1.1   Specification

FAA:

FAA-E-2938   Multimode Digital Radio (MDR)
                                    Subsystem Specification, August 8, 2000

2.1.2   Standards

2.1.3   Other Government Documents

FAA:

NAS-IC-41033502   Interface Control Document for Radio Interface Unit /
                                    Multimode Digital Radio, August 8, 2000

2.2   Non-Government Documents

EIA:

EIA-RS-232-C   Interface between Data Terminal Equipment and Data
                                    Communication Equipment Employing Serial Binary Data
                                    Interchange

3.0 REQUIREMENTS

3.1 Definitions

3.1.1 "Shall"

When used in this specification, the word "shall" refers to an explicit requirement of a system component or the complete system.

3.1.2 "Should"

When used in this specification, the word "*should*" refers to a desired characteristic of a system component or the complete system.

3.1.3 "Will"

When used in this specification, the word "will" provides information for a characteristic of a related system component or a complete related system.

3.2 Minimum Maintenance Data Terminal Platform (MDTS Host Computer) Configuration

a) The MDTS **shall** meet specified requirements while operating on industry standard laptop/notebook Personal Computers that are configured with at least the following:
   1) Windows 95, 98, 2000 and NT
   2) 100 Mb of Hard Drive space for MDTS exclusive use
   3) 32 Mb of RAM
   4) 800x600x8 display
   5) Pentium 200 processor
   6) RS-232 serial interface using DB-9 connector
   7) Single Standard High Density Floppy drive

3.3 Secured Access

a) The MDTS **shall** identify and authenticate the MDTS operator by User ID, of up to 20 characters, and Password, of at least 8 characters/numerals, before allowing operator access to MDTS functions.
b) All passwords and password authentication data stored within the MDTS, or on the MDT platform, **shall** be encrypted.
c) The MDTS **shall** store a security token and transfer it as defined by FAA-E-2939 Section 3.2.3.9.4.
d) The security token **shall** be stored in such a way that its function is not discernable.

3.4 Log In

a) The MDTS **shall** detect connection to an MDR, and log into the MDR, by issuing control parameter ID#1, Log-In, as specified in FAA-E-2938, Table 3-3.

b) The MDTS **shall** provide the MDT platform's unique identification number (for example, the Windows operating system OEM number) as the Terminal identification field in control parameter ID#1, Log-In, as specified in FAA-E-2938, Table 3-3.

c) Thirty-five seconds after the MDTS User commands an MDR to Reset, the MDTS **shall** automatically attempt to log into the reset MDR, to re-establish a control session.

3.5   Log-Out

a) Upon operator command, the MDTS **shall** log out of the MDR by issuing control parameter ID#1, Log-In, as specified in FAA-E-2938, Table 3-3, without the Security Token.

3.6   Display of Monitored Parameters

a) MDTS **shall** display operator selected MDR Monitored parameters and Control parameters, listed in table 3-3 and table 3-4, of the MDR specification.

b) MDTS **shall** allow operator to select either numeric or graphical (e.g. bar graph or simulated meter) type display for each parameter selected for display.

c) MDTS **shall** allow operator to select and display at least 3 parameters simultaneously.

d) MDTS **shall** allow the operator to select one-shot read, or continuous (near real time) read and display of Monitored Parameters.

e) When continuous (near real-time) read and display is selected for a parameter, the MDTS **shall** issue control parameter ID#30 Request Readback to the MDR at the operator-specified rate of once per second to once per 120 milliseconds.

f) MDTS **shall** update the display of operator-selected monitored parameters with each new readback sample when continuous read (near real time) read and display is selected.

3.7   Setting Of Control Parameters

a) The MDTS **shall** allow the operator to change the values of each MDR Control parameter.

b) After an operator commanded control parameter change, the MDTS **shall** update the display of the current value of the Control Parameter with the then-current value by re-reading the control parameter value.

> Note: Steps envisioned are
> 1) operator selects parameter to display
> 2) operator inputs value to change control parameter
> 3) MDTS sends change to MDR
> 4) MDR acknowledges change
> 5) MDTS reads control parameter from MDR, and then displays

c) MDTS **shall** display any error messages generated by the MDR relating to the attempt to change the value of the control parameter.

> Note: Range checking done by MDR, error messages generated by MDR, MDTS just displays MDR generated feedback

3.8 Alarm/Alert Threshold Setting

a) MDTS **shall** allow operator to read the MDR values for alarm thresholds and alert thresholds.
b) MDTS **shall** allow operator to change the alarm minimum thresholds, alarm maximum thresholds, alert minimum thresholds and alert maximum thresholds independently.
c) MDTS **shall** display any error messages generated by MDR relating to the attempt to set the minimum thresholds equal or greater than the maximum thresholds.

3.9 Control Parameter Sets

a) MDTS **shall** store at least fifteen control parameter sets, with operator selectable set labels, which can be selected for downloading from, or uploading to the MDR.
b) MDTS **shall** allow the operator to edit the Control Parameter values in each control parameter set.
c) MDTS **shall**, upon operator command, download from the MDR all Control Parameter values, associate them with their Control Parameter ID numbers, apply the operator-selected file name or label and store the Control Parameter set.
d) MDTS **shall**, upon operator command, upload the operator-selected control parameter set to the MDR.
e) MDTS **shall** verify all Control Parameter settings before indicating successful Control Parameter set uploads.
f) MDTS **shall** allow the operator to store Control Parameter sets on, or retrieve Control Parameter sets from, floppy disks.

3.10 Alarm/Alert Threshold Sets

a) MDTS **shall** store at least nine Alarm/Alert Threshold sets with operator selectable set labels, which can be selected for downloading from, or uploading to the MDR.
b) MDTS **shall** allow the operator to edit the alarm/alert threshold values in each alarm/alert threshold set.
c) MDTS **shall**, upon operator command, download from the MDR the alarm/alert threshold set, apply the operator-selected file name or label and store the alarm/alert threshold set.
d) MDTS **shall**, upon operator command, upload the operator-selected alarm/alert threshold set.
e) MDTS **shall** verify each alarm/alert threshold setting before indicating successful alarm/alert threshold set upload.

3.11 Operating Software Sets

a) MDTS **shall** store at least four MDR Operating Software sets which can be selected for downloading from, or uploading to the MDR.
b) MDTS **shall**, upon operator command, download from the MDR the operating software set, store and label the MDR operating software.
c) MDTS **shall**, upon double-verified operator command, upload to the MDR the operator selected MDR Operating Software set.

d) MDTS **shall** display the Digital Signature authentication result provided in by the MDR after software download to the Operating Software set.

3.12   Recording Of Monitored Parameters

a) MDTS **shall**, upon operator command, record the operator-selected continuous, real-time read / displayed monitored parameters, for later review and analysis.
b) MDTS monitored parameter recording **shall** be discontinuable at any time after initiation.
c) MDTS monitored parameter recording rate **shall** be operator selectable from 1 sample per minute to 1 sample per 120 milliseconds.
d) MDTS monitored parameter recording **shall** store up to 15,000 samples per recorded parameter.
e) MDTS monitored parameter recording **shall** record at least two parameters simultaneously, while displaying at least two monitored parameters.
f) MDTS monitored parameter recording **shall** record parameter ID, value and recording time.
g) MDTS **shall** allow control parameter setting while recording.

3.13   Local Diagnostic Audible Indication Function

a) MDTS **shall** provide an audible alert function, which will provide a MDT generated tone when the operator-selected parameter crosses an operator-selected high and/or low threshold.
b) MDTS **shall** provide an audible alert function, which will provide a MDT generated tone when the selected parameter achieves peak/valley (min/max) values.

3.14   MDR Event Log Download

a) MDTS **shall** store at least fifty MDR Event Logs, with operator selectable Log labels, which can be selected for downloading from to the MDR.
b) MDTS **shall**, upon operator command, download from the MDR the MDR Event Log, apply the operator-selected file name or label, and store the MDR Event Log.
c) MDTS **shall** allow operator to view the MDR Event Log.

4.0 QUALITY ASSURANCE PROVISIONS

4.1   Testing Conditions

a)   Unless otherwise specified, all testing will be performed under the following conditions:
    1) TBD…

4.3   Tests

a)   Testing of MDTS requirements will be conducted in accordance with Appendix B.
b)   TBD…

4.3   Verification Methods

a)   Verification methods will be utilized in measuring equipment performance and compliance of individual requirements contained in this specification. The four verification methods, TEST, DEMONSTRATION, ANALYSIS, and INSPECTION, listed in decreasing order of complexity, are described as follows:
    1) <u>TEST.</u> Test is a method of verification wherein performance is measured during or after the controlled application of functional and/or environmental stimuli. Quantitative measurements are analyzed to determine the degree of compliance. The process uses laboratory equipment, procedures, items, and services.
    2) <u>DEMONSTRATION.</u> Demonstration is a method of verification where qualitative determination of properties is made for an end item, including the use of technical data and documentation. The items being verified are observed, but not quantitatively measured, in a dynamic state.
    3) <u>ANALYSIS.</u> Analysis is a method of verification that consists of comparing hardware design with known scientific and technical principles, procedures and practices to estimate the capability of the proposed design to meet the mission and system requirements.
    4) <u>INSPECTION.</u> Inspection is a method of verification to determine compliance without the use of special laboratory appliances, procedures, or services, and consists of a non-destructive static-state examination of the hardware, the technical data and documentation.

5.0 PREPARATION FOR DELIVERY

a) The MDTS will be delivered in accordance with Section F of the contract.

6.0 NOTES

6.1   Notes on Information Items

The contents of this Section are for informational purposes only and are not a part of the requirements of this specification. They are not contract requirements nor binding on either the Government or the Contractor. In order for these terms to become a part of the resulting contract, they must be specifically incorporated in the schedule of the contract. Any reliance placed by the Contractor on the information in these Subsections is wholly at the Contractor's own risk.

6.2   Applicable Definitions

Definitions for the MDTS can be found in the Multimode Digital Radio Subsystem Specification, FAA-E-2938, Revision 2.0, August 8, 2000.

APPENDIX A

Acronyms

A/G	Air/Ground
ICD	Interface Control Document
MDR	Multimode Digital Radio
MDT	Maintenance Data Terminal
NEXCOM	Next Generation Air/Ground Communication
SSS	Subsystem Specification
SW	Software

APPENDIX B

Verification Requirements Testability Matrix

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

		A	I	D	T	N/A
3.0 REQUIREMENTS						X
3.1 Definitions						X
3.1.1 "Shall"						X
3.1.2 "Should"						X
3.1.3 "Will:						X
3.2 Minimum Maintenance Data Terminal Platform (MDTS Host Computer) Configuration	b) The MDTS **shall** meet specified requirements while operating on industry standard laptop/notebook Personal Computers that are configured with at least the following: 8) Windows 95, 98, 2000 and NT 9) 100 Mb of Hard Drive space for MDTS exclusive use 10) 32 Mb of RAM 11) 800x600x8 display 12) Pentium 200 processor 13) RS-232 serial interface using DB-9 connector 14) Single Standard High Density Floppy drive					
3.3 Secured Access	e) The MDTS **shall** identify and authenticate the MDTS operator by User ID, of up to 20 characters, and Password, of at least 8 characters/numerals, before allowing operator access to MDTS functions.					
	f) All passwords and password authentication data stored within the MDTS, or on the MDT platform, **shall** be encrypted.					
	g) The MDTS **shall** store a security token and transfer it as defined by FAA-E-2939 Section 3.2.3.9.4.					
	h) The security token **shall** be stored in such a way that its function is not discernable.					
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			A	I	D	T	N/A
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		A	I	D	T	N/A
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